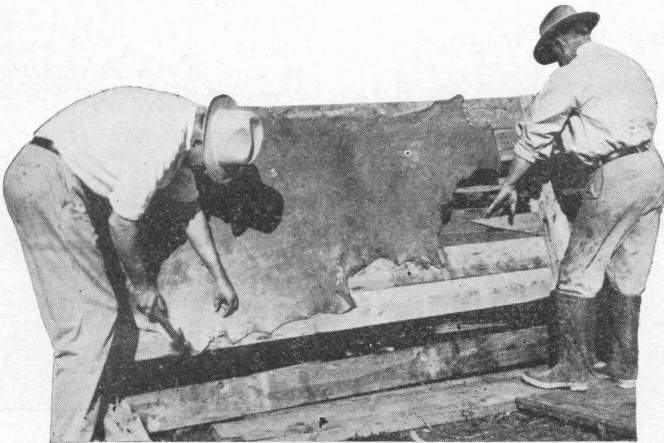
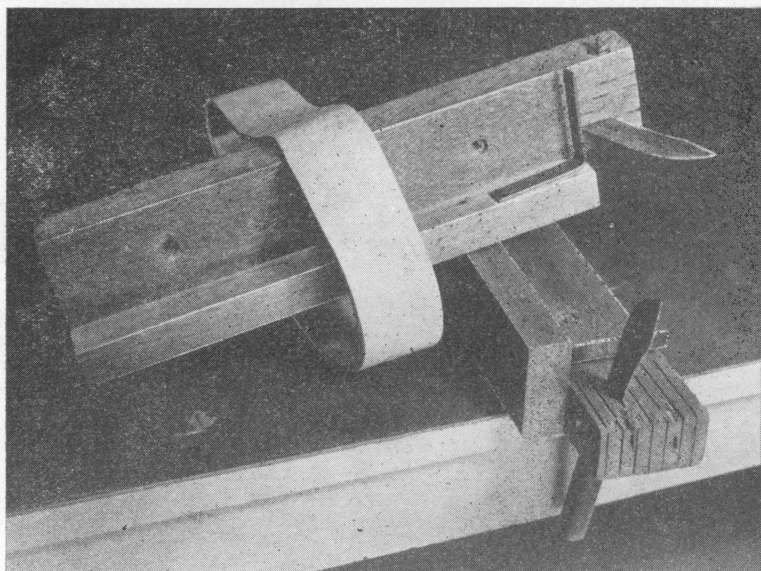


HOME TANNING OF LEATHER



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Home Made Gauge Knives—The materials required are one piece of timber 2 x 4 x 24 inches, one piece of timber 2 x 4 x 20 inches, one $\frac{1}{4}$ inch bolt or large nail, one corner brace 4 x 4 x $\frac{1}{2}$ inches, and one butcher knife.

Home Tanning of Leather

By M. K. Thornton, Leather Specialist

One of the oldest arts known to man, the tanning of leather, has become almost a lost art to farmers and ranchers. Yet it is a fairly easy process if care is taken.

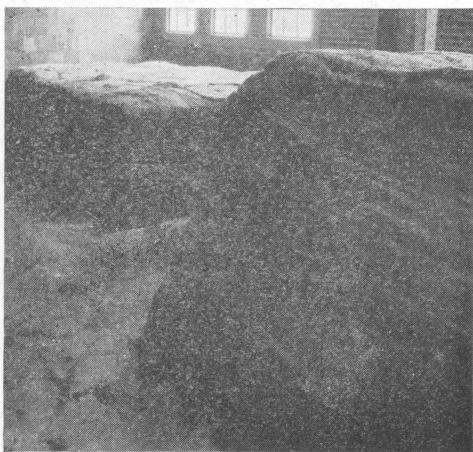
There are many methods of tanning, and no one of them may be called best. The methods described here are among the easiest and produce satisfactory results.

No attempt is made to give details to suit every kind of weather. The ideal temperature is from 70 to 75 degrees Fahrenheit. In no case should the hides be permitted to freeze. The warmer the weather the more quickly hides spoil, and as a result, there is greater likelihood of getting weak or tender leather.

The hides to be tanned may be fresh, green salt, dry salt, or flint. A fresh hide is one which has been taken from the animal and allowed to cool. A green salt hide is one which has been well salted shortly after being removed from the animal, folded and placed in a cool place until the salt has penetrated well, and then stored until ready for use. A dry salt hide is a green salt hide that has been dried. It should be dried in a cool shady place. A flint hide is one which has been dried immediately after removal from the animal. If it has been sun burned or damaged from being in the weather it will never yield good leather.

Fresh hides are more easily handled than those which have been salted and cured because they are already soft and pliable. It is always necessary to bring the other hides to this soft pliable condition before beginning the fleshing and dehairing operations.

It is important that the hides should at all times be completely covered by the solutions in which they are being soaked. Never put more than one heavy (35 to 50 lb.) hide in one 50 gallon barrel. Two 15-20 pound hides may be put in one barrel.



Hides not being tanned at once should be assorted or stacked as shown above.

The hides should be weighed after they have been softened, washed, trimmed and drained. This weight is used in figuring all formulas. The weights of chemicals given in all formulas are based on 100 pounds of drained and trimmed hides. It is not necessary to weigh them again during the process of tanning.

The hides should be drawn out of the soaking and lime liquors at least once every 12 hours and examined carefully to see if they are heating. This is especially necessary during the warm months. If the hides begin to heat, which means they are spoiling, they should be removed from the liquor and allowed to cool.

Care must be taken of the hands during the soaking and liming operations. Rubber gauntlets should be worn if available. If any cuts or abrasions are on the hands, and care is not taken, blood poisoning may result. After handling the hides, always wash the hands with vinegar or other mild acid solutions, then grease. Cuts should be covered with iodine or other antiseptic. If the hands are not washed with vinegar or other mild acid solutions after handling the hides in the liming bath or after dehairing, they are likely to swell and crack.

Before Tanning Soften and Clean the Hides

After the hide has been removed from the animal, wash it to remove all dirt and blood before starting the tanning.

For green salt hides shake the salt off, then put them in fresh water to soak until soft and pliable. Change the water after eight or 10 hours in order that the salt may be more nearly removed. Usually 24 hours will be all the time that is necessary for softening a large cow hide, while in the case of the lighter goat and sheep skins two or three hours will be long enough. With skins of rabbits and other small animals, soaking for half an hour may be sufficient to bring them to the degree of softness and flexibility that will be required.

In handling dry salt hides, sweep the salt off and put them in water to soak until soft and pliable. The water should be changed at least once during the soaking process.

Care should be taken when handling dry salt hides not to crack them. They should not be folded and crammed down in the barrel of water. Roll them in a cylinder and feed them into the water as they soften.

Flint hides should be worked during the winter months for best results. Great care should be used with flint hides to prevent rotting, especially from April to October. These hides do not soften readily, and during the warm months loss is very likely to occur unless some preservative is used. A good preserving agent is made by adding two pounds of borax to 100 pounds of hides in enough water to cover them.

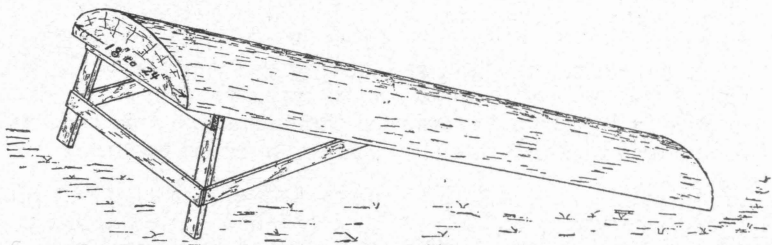
Flint hides should not be folded and crammed down into the barrel of water as they will be cracked. If available, put them in a creek or pond until soft enough to permit putting into a barrel. If a creek or pond is not available, a shallow hole dug in the ground and filled with water will suffice. If the water evaporates or seeps out too rapidly, cover the hide with mud for a day or two. It can then be put in the barrel. As soon as the hides become soft and pliable, remove from the soak water and start the other operations immediately. The length of time necessary to soften flint hides varies with the weight. Heavy hides may require from 72 to 96 hours, depending upon the temperature of the water and the condition of the hides.

After soaking, all hides should be trimmed and fleshed before further treatment. The shanks, tails, and ears should be cut off and discarded, and all pieces of flesh and fat should be removed. The hides should then be weighed. It is usually advisable to split large hides down the center of the back before tanning.

A great tool for removing flesh and fat is a draw knife. A broken spring which has been ground to an edge on one side will give good results; the other side should be ground square for use in dehairing.

The Next Step Is Dehairing

The softened hides or skins should be dehaired for making harness, sole, lace, or glove leathers. Put the hides into water containing two pounds of hydrated lime (water-slaked lime) per 100 pounds of drained and trimmed wet hides, and plunge up and down two or three times. (Air slaked lime or lime that has stood open for a long time will not be satisfactory). The following day add the same amount of lime to the bath and stir well. Plunge the hides in the bath until uniformly covered with the lime liquor. If the temperature of the bath is above 80 degrees Fahrenheit, add the same amount of lime the third day, and on the fourth day add another equal portion of lime. If the temperature of the bath is below 80 degrees Fahrenheit, no lime is added the third day, but is added on the fourth and



This horse was constructed of a half tree from which the bark has been removed, one end of which is jacked up so that the top will be about on the level with one's belt. If a tree of sufficient size is not available, the horse may be made from crossties, bridge timbers, or from other similar materials spiked to a support and then rounded slightly to a circular top surface.

fifth days. If the temperature of the bath is below 65 degrees Fahrenheit, an equal amount of lime is added the second, fourth, and sixth days. Stir the liquor thoroughly after each addition. Plunge the hides two or three times each day to be sure that the liquor comes in contact with all parts.

When the liming has been completed, the hair should slip when a stick is rubbed across it. Remove the hides from the bath and place across a wooden horse. Scrape the hair off, after which examine the hide for any remaining pieces of flesh which should also be removed.

The hair may be scraped with any convenient tool. The back of a draw knife or the square side of the car spring previously described may be used. The sharp edge of either is used for removing the flesh and fat remaining. The hides should not be exposed to the direct sunlight at any time nor should they be permitted to dry out at any time during the tanning operations.

Lighter skins, such as those of sheep and goats, require considerably less time for dehairing. Rubbing a stick across the hair side of the skin is a good test; if the hair slips out easily, the skin is ready for dehairing as previously described.

If a flexible leather is required, the hides or skins should be placed in a fresh lime bath using two pounds of hydrated lime per 100 pounds of hides. They should be allowed to remain in this bath until the scurf or yellowish coating on the surface can be removed by rubbing the back of a kitchen knife across the grain or hair side. Heavy hides may be allowed to remain in the bath from 12 to 24 hours longer than necessary for the scurf to slip. The longer the hide remains in this lime bath the more flexible but the weaker it becomes. The length of

time must be determined by the operator to meet the requirements of the leather he desires.

Delime the Hides after Dehairing

After the scurf is removed, the hides are then delimed. This may be accomplished by using vinegar, sour bran mash or chemicals. A good deliming bath consists of five pounds muriatic acid and 15 pounds of salt per 100 pounds of hides in sufficient water to cover the hides. The hides are hung in the liquor and stirred occasionally until the lime has been removed. To determine when the lime has been removed, cut a portion from the thick part of the hide and examine. If the lime has been removed, the portion will be uniform in appearance. If a streak shows, return to the bath. Heavy hides may require soaking for 24 hours. If necessary, they can be left in the deliming bath for 48 hours. The lighter pelts can be removed in a shorter period of time. They are then hung up to drain, taking care than they are hung smoothly.

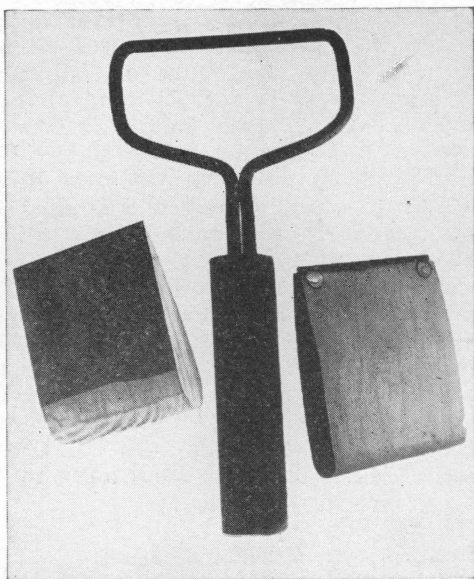
Tanning by the Two Bath Chrome Method

After the hides have drained, hang them in a bath composed of five pounds of bichromate of soda or bichromate of potash, five pounds of salt and three pounds of muriatic acid per 100 pounds of hides dissolved in the smallest amount of water necessary to cover the hides. Work the hides frequently in the bath to insure the liquors striking in uniformly. Let them remain in this bath until the chrome, which is yellow, has struck through; after which, hang up to drain. The pieces should be hung smoothly to avoid rough wrinkly leather. To determine whether the hides have soaked long enough in the chrome bath, cut them at the thickest part. A uniform yellow color should show throughout. If the hides are not worked frequently in this bath during the first hour, the chemicals will not enter where they are folded and white or light colored spots will result.

If direct sunlight strikes the hide during the bath, a sun burn will result and give hard and brittle leather.

Place the drained yellow hides in a bath of 12 pounds hyposulphite of soda (sodium thiosulphate) per 100 pounds of hides dissolved in the smallest amount of water necessary to cover the hides or skins easily. If the hides are not covered, the chemicals will not act on them and spots will result.

Let the hides remain in this bath until they turn a dirty blue. At this stage, add three pounds of common salt per 100



Instruments, easily made, may be useful in slicking down the grain side of the leather.

pounds of hides and stir. Add six pounds of muriatic acid per 100 pounds of hides to the bath in three hourly portions of two pounds each, stirring well after each addition.

Work the hides frequently in this bath to insure uniform action and let them remain there until a piece of the thick portion cut off shows that the leather is light blue throughout. Remove from the bath and allow the leather to drain for at least 12 hours. Up to 24 hours draining will

not damage the hide. If the hides are not moved occasionally, spots will be in the finished leather. These spots will be hard and brittle.

After draining, place the leather in a solution of one-half pound cooking soda per 100 pounds of hides in sufficient water to cover the hides. Allow to remain about 12 hours, remove, wash, and drain. (If this operation is omitted, the grain is likely to be hard and brittle.) Place the hide on a table and slick the grain side (hair side) down with a small round instrument. This instrument may be a one-fourth inch iron or brass rod bent, a one-fourth inch pipe six to eight inches long bent, or a hardwood block which is rounded off. This slicking operation helps to make a smooth uniform leather.

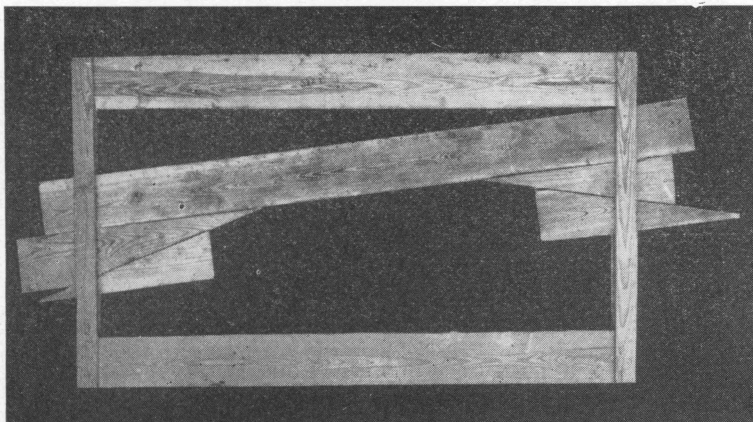
Let dry slightly, then coat the grain side with a mixture made of equal parts of neats foot oil and tallow. A good mixture for oiling may be made by dissolving one pound of soap free from lye in one-half gallon of hot water and stirring into this one gallon of neats foot oil. (The neats foot oil-tallow mixture may be used instead of pure neats foot oil.) This should be a thin paste when finished and may be used instead of neats foot oil-tallow mixture.

Although the mixtures mentioned above are to be preferred for leather from the tanning vats, other mixtures for oiling leather may be made as follows: one pound of soap, one-half gallon water, one-half gallon neats foot oil and one-half gallon melted tallow; one pound soap, one gallon hot water, one-half gallon neats foot oil, and one-half gallon melted tallow; or five pounds soap, one gallon hot water, one-half gallon neats foot oil and one-half gallon melted tallow. The ratio of soap, water, oil, and tallow may be shifted considerably and give good soaps for oiling harness and saddles. The more tallow in the oil mixture the firmer the leather will be.

Roll the hide up and allow it to dry slowly. A smoother piece of leather can be made if the leather is stretched on a frame or wall before drying. If the leather is stretched on a frame, care should be taken to prevent drying too rapidly. It should require 48 hours to dry. Oil should be applied to the leather after it has been on the frame for one day.

If the air is dry and the leather will dry too rapidly, it may be oiled when the water stops dripping. After oiling, the leather may be covered with wet sacks to assist in preventing too rapid drying.

When the leather has absorbed enough oil, the surface will be soft and velvety to the touch. If it does not have this soft velvety touch, wet it down and repeat the oiling. Before it is completely dry, work the leather, flesh side down, on a stake such as a post, barn stud or board fence to make it pliable. The more working it gets at this stage, the more pliable and soft it will become.



A frame similar to the above is very useful for stretching leather after it is tanned. For heavy hides, it should be eight feet long. The top and bottom boards should be of 1 x 8 board and the uprights of 1 x 4 board five feet long. The movable board in the middle should be 1" x 8" x 10 feet long. For smaller hides, it can be built of lighter timber and be smaller.

Amount of Materials Necessary

To Tan 100 Pounds of Hides by the Two Bath Chrome Method

12 lbs. hyposulphite of soda (sodium thiosulphate)	13 lbs. muriatic acid
$\frac{1}{2}$ lb. cooking soda	20 lbs. salt
1 gal. neats foot oil	5 lbs. bichromate of soda or potash
10 lbs. hydrated lime	

Bark or Vegetable Tanning Is Another Way

Sole leather is usually made by the bark-tan method, but cool weather is the only time to begin this process. After the hides have been delimed as previously described, they may be tanned with vegetable tanning extracts instead of chrome. These extracts may be purchased from some chemical manufacturing house or made from native materials. These native materials may be bitterdock roots, osage orange roots, dwarf palmetto roots, or any of the oak barks including black jack. The tanning materials—about 200 pounds of dried bark for each 100 pounds of hides—should be allowed to dry and then ground finely.

About 40 pounds of the dried ground materials should be placed in a feed sack and hung in a wooden barrel. Thirty gallons of boiling water are poured through the sack of material until the barrel is about full. The sack should be allowed to remain in the barrel about a week. The liquor must not come in contact with iron vessels as they will be ruined. Use wooden barrels and brass bound wooden buckets.

Pour two bucketfuls of the extract and one-half gallon of vinegar into a 50 gallon barrel and mix 40 gallons of cold water thoroughly with it. Wash the delimed hides thoroughly and put in this solution, taking care that the hides are not wrinkled and that no trapped air bubbles are in the folds.

Allow the hides to remain in this liquor one or two days. Then remove from the barrel and take out two bucketfuls of the spent liquor; replace with two bucketfuls from the barrel of fresh extract and mix thoroughly.

Put the hides back in the barrel and allow to stand for two or three days. Periodically (two to four days) remove two bucketfuls of liquor from the barrel in which the hide is being tanned, and replace with two bucketfuls of fresh extract.

(CAUTION—Plunge the hide in the liquor several times a day to prevent the liquor striking in unevenly.)

Repeat this until the hide has become stained with the tanning extract throughout. At this time, add some of the re-

maintaining fresh ground tanning material to the barrel containing the hide until the hide is completely packed in the tanning material. Allow to remain in the moist tanning material until it has thoroughly tanned as shown by a cut portion.

Lighter skins do not require packing in the ground tanning material to convert them into suitable leather. The longer the skins remain in the tanning material the heavier and stiffer the leather will be.

The time necessary for tanning will depend upon the kind of leather desired and can be determined by cutting a piece of the hide so as to examine the degree of penetration. After the tanning has proceeded as far as desired, remove the leather from the tanning bath, wash and slick the grain down with a blunt instrument, as described under chrome tanning.

Hang the leather in a cool place to dry. A smoother piece of leather can be made if the leather is stretched on a frame or wall before drying. If the leather is stretched on a frame, care should be taken to prevent drying out too rapidly. It should require about 48 hours to dry. As the leather begins to dry, give it a thorough oiling on the grain side with the neats foot oil-tallow mixture and allow to dry slowly in order that the oil will penetrate well.

Before it is completely dry, work over a stake to render flexible, unless sole leather is being made. If it becomes too dry before the oil has penetrated properly, wet again, oil a second time, and allow to dry. This operation should be repeated until the desired pliability is obtained.

Alum Tanned Lace Leather Is Made This Way

For the making of alum tanned lace leather, hang a delimed hide in a solution made from six pounds of alum and 12 pounds of salt per 100 pounds of hides dissolved in just enough water to cover it. When the alum



From time to time the directions call for "working" the leather until pliable. Above is shown a piece of equipment which may be used for this purpose, or a stout post or stake firmly fixed in the ground may also be useful.

has thoroughly penetrated the hide, it has lost a raw appearance and the fibers are distinctly visible. At this stage rinse in water then place in a bath containing one-half pound of cooking soda per 100 pounds of hides and allow to remain over night. Then hang up to dry.

When about half dry, roll up in a tight roll and cover with a piece of sacking in order that the hide may become uniformly moist and soft. It must be carefully watched during this process to prevent heating. When uniformly moist and soft, coat the grain side with the neats foot oil-tallow mixture, or the soap and oil mixture described previously. Allow to become nearly dry, then work until pliable. If it is hard and has a tendency to break, moisten and work until pliable. The hide may be stretched on a frame after rinsing and allowed to dry slowly. When water has stopped dripping from the hide, coat the grain side with the neats foot oil-tallow, or the soap oil mixture, and allow to dry down until nearly dry. Then remove from the frame and work until pliable.

Making Rawhide Is Done this Way

For making rawhide, a good method is to take the hide from the lime bath, dehair, wash in plain water until the surplus lime is removed, oil thoroughly on the grain side with the neats foot oil-tallow mixture and hang up to dry. When nearly dry work until soft. If it is stiff and has a tendency to break, moisten uniformly and give another oiling and working. Repeat until the hide is thoroughly pliable when dry.

Furs and Hair Robes May Be Tanned at Home

The tanning of furs and hair robes may be done with an alum tan, although various other agents may be used with equal success. If the hair has begun to slip before tanning begins, then nothing the tanner can do will cause it to hold. For this reason, only fresh skins or those which have been well salted and cured should be used.

Clean and soak the hides until soft and pliable before beginning tanning operations. If the hides are heavy and require more than two or three hours for softening, add two pounds of muriatic acid per 100 pounds of hides to the bath to prevent rotting and to set the hair while softening. Oxalic acid or formic acid may be used instead of muriatic acid.

When the hides are soft and pliable, they are ready for tanning. Greasy hides such as sheep skins, should be washed

with soap and water, or gasoline, before tanning in order to remove thoroughly the grease from the wool, after which they should be given a thorough rinsing to remove any soap that may adhere to the wool.

When clean, soft and pliable, with all fat and flesh removed, trim the skins to shape and place in a solution of five pounds alum and six pounds salt per 100 pounds of hides dissolved in the smallest amount of water which will cover the hides until the alum has thoroughly penetrated. Light skins, such as sheep and goat skins, do not require more than 24 hours for soaking in alum bath. Heavy hides may require five or six days for the alum to penetrate thoroughly. Stretch skins on a frame or on a wall where they will not be exposed to the sun, and allow to dry partially.

When almost dry, apply uniformly to the flesh side a paste composed of four pounds of alum, three pounds of common salt, four pounds of flour, one pound of egg yolks, one pound of olive oil or neats foot oil or other similar oil. Make this paste by dissolving the alum and salt in the smallest amount of water possible. Add this to a thick paste of flour in water. When these have been well mixed, beat the egg in, and lastly add the oil. This paste should have a consistency that will brush on well.

Allow the skins to remain for some time with the paste on them. Apply this paste three times and dry slowly. Remove the skins from the frame, rinse with water, wash with soapy water, rinse and restretch. This treatment with the soapy water, to which a small amount of neats foot oil or olive oil has been added, will tend to make the hides more resistant to wear and weather. When the skins are nearly dry, remove from frames and work vigorously over a stake. The resultant leather should be soft and pliable. If it not, moisten the skins uniformly and give another working until pliable and soft. A good method of moistening is to roll the skins in a wet sack. The more working the skins receive while they dry, the softer the leather will be.

If it is desired to dye the skins or furs, they may be dyed after rinsing off the excess alum paste. Any cold water dye which will be fast to light and rubbing can be used. To dye them, follow the directions given on the package, but do not heat over 110 degrees F. These skins are then stretched and allowed to dry and worked in the same manner as the undyed skins. The skins should be given a light oiling with the oil-soap mixture previously described.

Re-tanning: Alum tanned leather may be made more resistant to wear and weather by re-tanning with vegetable extracts or chrome tan. However, either method will color the leather. In the case of a vegetable re-tan, the alum-tanned leather may be dipped directly into a strong extract and allowed to remain until the vegetable tan has penetrated. This is permissible because the alum tannage has opened the grain and the liquors penetrate rapidly without a hardening of the leather. After a vegetable re-tan, it will be necessary to oil the leather with neats foot oil and work.

Alum and Gambier Tanning Is Done this Way

The formula for tanning with alum and gambier is: alum, six lbs.; common salt, five lbs.; gambier, two or three lbs.; flour, one lb.; and water, 10 gallons.

Dissolve the alum and salt in a little water; also dissolve the gambier by boiling in a little water. Mix the two solutions. The flour is made into a smooth paste with a little warm water, and the alum, salt, and gambier solution is added to the paste. Ten gallons of water is added to the mixture and stirred thoroughly. Apply the paste to the flesh side of the skin with a brush, afterwards folding the skins. Allow to remain over night and give another coating of the paste; fold, and allow to remain over night again. The skins, after lying for two days in the wet condition, are hung up and dried. Then rinse and allow to dry again. When nearly dry, work until flexible.

Another Way for Tanning with Alum and Gambier

To tan wool skins or dehaired skins with gambier, first tan them with alum and salt, as described under the making of lace leather, and then put them into weak gambier liquor after rinsing thoroughly. For 100 pounds of skins, dissolve two pounds of cube gambier or Terra Japonica in four gallons of warm water. Put the alum tanned skins in enough water to cover them easily in which one-half gallon of gambier solution has been well mixed. Each succeeding day, add one-half gallon of gambier solution until all has been added. After all the solution has been added, allow to remain for 24 hours. Then remove, rinse, and stretch. When nearly dry, remove from frame and work until pliable.

Tanning Light Skins with Gambier Is Done this Way

Dissolve solid or powdered gambier or Terra Japonica in the proportion of one ounce for every one gallon of water. Entirely immerse the skin. Stir the solution and change position of the skin very often during the early stages, as often as every hour during the first day, if possible. Twenty-four hours

after starting to tan, dissolve in the smallest possible quantity of water (approximately one quart), one ounce of gambier for every gallon of water used in making the first solution. Add to the first mixture and stir. After three days strengthen the tanning solution again by adding one ounce of gambier to every gallon of water in the solution. Repeat until thoroughly tanned. Remove from the bath and rinse. Then oil the grain side with neats foot oil and when nearly dry, work until flexible.

Making Harness

Straps cut from a side of leather may be made into harness by riveting or sewing. Riveting is much faster, but sewing makes a neater job.

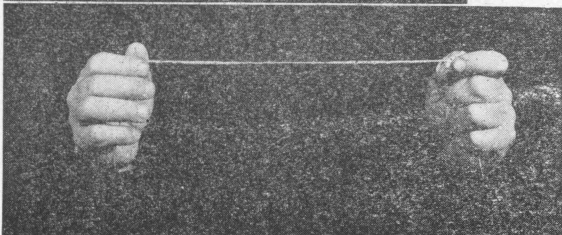
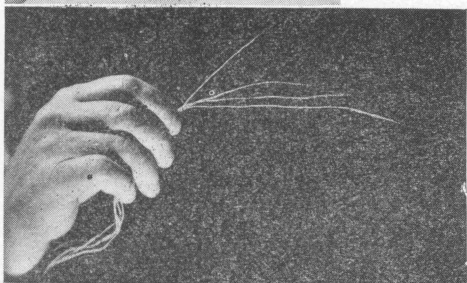
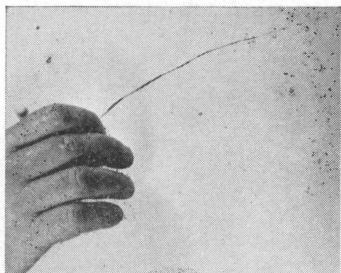
All that is required for sewing is an awl, two harness maker's needles, a piece of harness maker's wax, and flax thread No. 10. For sewing harness, two needles are used, both

needles are run through the same awl hole from opposite sides. The thread is built up into 3 or more strands with a long tapering end. To make up a multiple strand thread is a simple process and with a little practice a strong durable thread can be made.

The flax thread should be untwisted and pulled apart. This

is done by taking the thread under the palm of the right hand and on the leg and rolling the thread away from the body until a light pull will tear it apart. Make as many strands of the same length by this process as will be required in the finished thread (three for lines and other light work to six or seven for tugs, or other heavy work.)

When the required num-



ber has been made, put the strands together so that each succeeding thread projects about one inch beyond the other before it. The ends are then waxed. After the ends are waxed, twist the thread and wax thoroughly with harness wax. It is advisable to place the thread between a piece of leather and the wax.

Draw one end of the waxed thread through the eye of the needle for about two or three inches and turn it back on itself and twist, rubbing vigorously to melt the wax so it will hold. Then the other end of the thread is put in a needle. If the thread does not draw well through the awl holes, rub lightly with beeswax, but do not wax the ends as the thread will untwist.

The straps should be beveled on the flesh side and two pieces lapped two to two and one-half times the strap width. In lapping, the smooth side of one strap is pressed against the flesh or rough side of the other. After lapping the ends, mark off a line for sewing and mark the place for the awl holes with a finishing wheel or other marker to give uniform stitches. Then put it in a clamp and sew. Always make the first and last stitch outside the lap. The next to last stitch should have a knot tied in it. This is done by running the needle from one side through the thread loop from the other and pulling this knot inside the leather. The beveled edge should be fastened down with glue or sewed down.

A convenient clamp for sewing may be made from 2 barrel staves and a hinge as shown in the figure.

